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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/634,141 | 08/04/2003 | Ilya V. Karpov | PTO.0554US (P16589) | 5089 |
| 21906 7590 12/30/2008 TROP, PRUNER & HU, P.C. 1616 S. VOSS ROAD, SUITE 750 HOUSTON, TX 77057-2631 | | | | |
| EXAMINER | | | | |
| LEE, EUGENE | | | | |
| ART UNIT | | PAPER NUMBER | | |
| 2815 | | | | |
| MAIL DATE | | DELIVERY MODE | | |
| 12/30/2008 | | PAPER | | |

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ILYA V. KARPOV

Appeal 2009-0098
Application 10/634,141
Technology Center 2800

Decided: December 30, 2008

Before KENNETH W. HAIRSTON, JOSEPH F. RUGGIERO,
and CARLA M. KRIVAK, *Administrative Patent Judges*.
HAIRSTON, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134 from a final rejection of claims 1, 4, 8, 10¹, and 32 to 37. We have jurisdiction under 35 U.S.C. § 6(b).

¹ Claim 10 improperly depends from canceled claim 9.

We will sustain the indefiniteness rejection and the obviousness rejection.

Appellant has invented a method of forming a phase change memory. The method of forming the phase change memory comprises the steps of forming a pore in an insulator, forming a sidewall spacer in the pore, forming a heater material in the space formed by the sidewall spacer, removing an upper portion of the heater material to form a gap, filling the gap with a phase change material that extends over the insulator, and patterning and etching the phase change material over the insulator (Figs. 2; Spec. 8 and 9).

Claim 1 is illustrative of the claimed invention, and it reads as follows:

1. A method comprising:
forming a pore in an insulator;
forming a sidewall spacer in said pore;
forming a heater in said pore with said sidewall spacer;
removing an upper portion of said heater to form a gap;
filling the gap with a phase change material that extends over said insulator; and
patterning and etching said phase change material over said insulator.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

| | | |
|------------|-----------------|---------------|
| Harshfield | US 6,117,720 | Sep. 12, 2000 |
| Hudgens | US 6,507,061 B1 | Jan. 14, 2003 |
| Chiang | US 6,545,287 B2 | Apr. 8, 2003 |

The Examiner rejected claims 32 to 37 under the second paragraph of 35 U.S.C. § 112 for indefiniteness.

The Examiner rejected claims 1, 4, 8, 10, and 32 to 37 under 35 U.S.C. § 103(a) based upon the teachings of Chiang, Harshfield, and Hudgens.

ISSUES

(1) Indefiniteness

The Examiner states that the metes and bounds of the term “sublithographic” are not clear because the term is not defined by the claims, and the disclosure does not provide a standard for ascertaining the requisite degree of the term. The Examiner further states that the skilled artisan would not know “how ‘small’ a pore or otherwise has to be in order to be categorized as ‘sublithographic’” (Ans. 4), whereas the Appellant argues that the term “sublithographic” is inherent in the use of a spacer in the formation of the memory device (App. Br. 10). In other words, Appellant argues that “[a] spacer is able to form a sublithographic dimension because it is possible to control the thickness of a deposited or otherwise applied layer to a greater degree of accuracy than one could use lithography to etch such a structure” (App. Br. 10). Appellant additionally argues that the skilled artisan would know from the discussion on page 8 of the Specification that the opening defined by the spacers 24 in the memory device would result in a “sublithographic” structure (Reply Br. 1 and 2). Thus, the issue before is has the Appellant shown error in the Examiner’s indefiniteness rejection of claims 32 to 37 based upon use of the term “sublithographic?”

(2) Obviousness

Appellant argues that the applied references do not teach the claimed steps of “forming a heater in said pore with said sidewall spacer,” and “removing an upper portion of said heater to form a gap” (App. Br. 10 and 11; Reply Br. 3 and 4). Accordingly, the issue before us is has the Appellant shown error in the Examiner’s finding that the claimed process would have been obvious in view of the teachings of the applied references?

FINDINGS OF FACT

(1)Indefiniteness

1. Appellants’ disclosure states (Spec. 8) that:

In accordance with another embodiment of the present invention, shown in Figure 2, substantially the same structure may be utilized with the exception that a sidewall spacer 24 may be provided within the pore 18. The spacer 24 may be formed of an insulating material that is anisotropically etched, in one embodiment.

As a result, a slightly smaller metal heater 16a results in an opening may be created by the sidewall spacer 24. The opening defined by the spacer 24 may be smaller than that available within the limits of the available lithography.

(2) Obviousness

2. As indicated *supra*, Appellant forms a pore in an insulator material, forms a sidewall spacer in the pore, and then forms a heater material in the sidewall spacer in the pore. The heater material formed in the sidewall spacer extends up to the upper level of the insulator material.

3. Appellant recognizes that the heater material can not remain level with the upper level of the insulator material because it will form a parasitic conductive path to an overlying top electrode for the memory device (Spec. 2 and 4).

4. In order to prevent the formation of the parasitic conductive path, Appellant removes an upper portion of the heater material in the insulator pore via an etching step (Spec. 8 and 9).

5. Chiang describes a phase change memory (Fig. 7) in which a pore 31 is formed in an insulator material 14. A sidewall spacer 24 is then formed in the pore 31. Thereafter, a heater material 22 is formed in the pore within the sidewall spacer 24. The heater material 22 is formed at a level below the upper surface of the insulator material 14. A phase change material 18 is then deposited over the heater material 22 in the space between the sidewall spacers 24 (col. 3, ll. 37 to 41).

6. Chiang avoids ineffective heating of the phase change material by not filling the heater material 22 to the upper surface of the insulating material 14 (col. 3, ll. 41 to 49).

7. Harshfield describes a phase change memory cell in which a heater material 61 is deposited in an opening 52 in an insulating material 50 (Fig. 4). The heater material 61 initially extends to the upper level of the insulating material 50, but the height of the heater material 61 in the opening 52 is lowered until it forms remainder heater material portion 42 (Fig. 5; col. 4, ll. 22 to 38).

8. Hudgens describes the use of a patterning and etching step during the formation of a phase change memory device (Fig. 6; col. 3, ll. 26 to 28).

PRINCIPLES OF LAW

(1) Indefiniteness

The test for definiteness under the second paragraph of 35 U.S.C. § 112 is whether “those skilled in the art would understand what is claimed when the claim is read in light of the specification.” *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576 (Fed. Cir. 1986).

(2) Obviousness

An improvement in the art is obvious if “it is likely the product not of innovation but of ordinary skill and common sense.” *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1742 (2007).

ANALYSIS

(1) Indefiniteness

When we turn to the Appellant’s disclosure for an understanding of the claimed term “sublithographic,” we find the disclosure never mentions the term, and the disclosure is completely silent as to what is meant by the term. *See Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d at 1576. The term “lithography” is mentioned in Appellant’s disclosure (Finding of Fact 1), but it does not convey to the reader how to determine the boundary between “lithography” and sublithography. Without such an explanation, we agree with the Examiner that the skilled artisan would not know how small the pore in the insulating material has to be to meet the “sublithographic” standard (Ans. 4). Thus, the Examiner correctly concluded that the claims are indefinite because the metes and bounds of the term “sublithographic” can not be determined from Appellant’s disclosure.

(2) Obviousness

We agree with the Appellant's argument (App. Br. 10 and 11; Reply Br. 3 and 4) that the reference to Chiang does not teach forming the heater material 22 in the pore 31 to the upper surface of the insulator material 14, and then removing an upper portion of the heater material 22 in the pore 31 as set forth in the claims on appeal. However, as indicated *supra* (Finding of Facts 5 and 6), Chiang does not need to remove an upper portion of the heater material because he fills the heater material 22 in the pore 31 to a level below the upper level of the insulating material 14. By skipping the claimed step of removing an upper portion of the heater material, Chiang saves not only processing time but material that is wasted by the removal of the heater material. In other words, by filling the heater material below the upper level of the insulating material, Chiang can avoid the claimed step of removing the upper portion of the heater material, and in the process avoid the problem created when the heater material is too high in the insulator material (Findings of Fact 2 to 4). Thus, for the advantages of time and material savings, we find that it would have been manifestly obvious to the skilled artisan to perform the method steps of claim 1 according to Chiang, but without the step of removing the upper portion of the heater. After all, the artisan is presumed to possess both skill and common sense. *KSR International Co. v. Teleflex, Inc.*, 127 S. Ct. at 1742. If additional heater material is required to be removed from the heater material in Chiang, then it would have been obvious to the skilled artisan to remove the heater material as taught by Harshfield (Finding of Fact 7). With respect to the claimed patterning and etching step, we agree with the Examiner that it would have

been obvious to one of ordinary skill in the art to pattern and etch the phase change material that lies over the insulator material in Chiang according to the teachings of Hudgens (Finding of Fact 8).

In summary, the obviousness rejection of claim 1 is sustained. The same holds true for claims 4, 8, 10, and 32 to 37 because Appellant has not presented any patentability arguments for these claims apart from the arguments presented for claim 1.

CONCLUSIONS OF LAW

Appellant has not shown that the Examiner erred in rejecting claims 32 to 37 for indefiniteness based upon use of the term “sublithographic.”

Appellant has not demonstrated that the Examiner erred in rejecting claims 1, 4, 8, 10, and 32 to 37 for obviousness based upon the teachings of Chiang, Harshfield, and Hudgens.

ORDER

The indefiniteness rejection of claims 32 to 37 is affirmed.

The obviousness rejection of claims 1, 4, 8, 10, and 32 to 37 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

KIS

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